2576 David McComb
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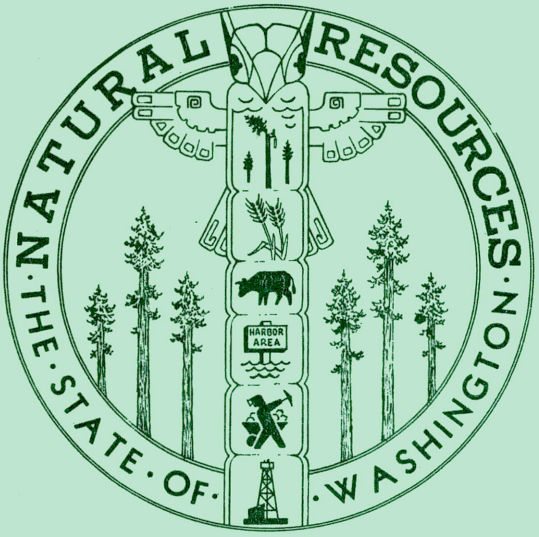

Resource Management Reports

No. 3 April, 1965

THE DOUGLAS FIR TUSSOCK MOTH IN EASTERN WASHINGTON -1964-

State of Washington
Department of Natural Resources
Bert L. Cole, Commissioner

David McComb

THE DOUGLAS-FIR TUSSOCK MOTH IN EASTERN WASHINGTON

1964

by

Rick Johnsey, Entomologist

Forest Land Management Division- Donald R. Hopkins, Supervisor

March 1965

State of Washington

DEPARTMENT OF NATURAL RESOURCES

Bert L. Cole
Commissioner of Public Lands

L. T. Webster
Supervisor

THE DOUGLAS-FIR TUSSOCK MOTH IN EASTERN WASHINGTON - 1964

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THE DOUGLAS-FIR TUSSOCK MOTH IN EASTERN WASHINGTON
1964

INTRODUCTION

The Insect

The Douglas-fir tussock moth, Hemerocampa pseudotsugata (McDunnough), is a major defoliator of Douglas-fir and true firs in western North America. The adult male is a nondescript grayish moth having a wingspread of 1 to 1¼ inches. The female has small rudimentary wings and cannot fly. She has fully developed eggs inside her enlarged abdomen when she emerges from the pupal cocoon. The eggs are laid on the outside of the pupal cocoon soon after mating has occurred. They are attached to the cocoon with a frothy gelatinous substance which contains numerous hairs from the female's body. Soon after egg disposition the female dies and the eggs overwinter in this grey woolly mass attached to the cocoon.

The eggs begin to hatch in late May or early June and the tiny hairy caterpillars are blown about by the wind. This is the principal method by which the insects spread into infested areas.

The larvae pupate in late July or early August inside silken cocoons attached to the trunk and branches of the host tree. When the population is heavy, the cocoons may be bunched on the trunk, or larger limbs, and on objects some distance from the tree.

Natural Enemies

The Douglas-fir tussock moth has a number of natural enemies, the most important being a polyhedral virus disease that is capable of eliminating epidemics of the insect.

Important insect enemies of the tussock moth include a small wasp belonging to the genus Telenomus that parasitizes the eggs, and various icheneumon wasps and fly parasites that parasitize the larval and pupal stages. 1/

Previous Outbreaks

The Douglas-fir tussock moth killed over 300 million feet of fir timber in 1929-30 on the Colville National Forest in eastern Washington. Another outbreak in 1946-47 covered over 500,000 acres in the fir forests of northern Idaho, northeastern Oregon, and eastern Washington.

Present Outbreaks

An aerial survey conducted in the summer of 1963 detected 40 to 50 farm woodlots in eastern Washington on which fir trees (primarily Douglas-fir) were being defoliated by the Douglas-fir tussock moth. The infested areas varied in size from $\frac{1}{4}$ acre to 25 acres. Most of the infested areas were located in timber stands varying from a few to 200 acres in size.

While predicting an upward trend for the tussock moth in 1964, the U.S. Forest Service, R-6, indicated no large scale control project would be necessary but advised that owners of infested woodlots might need to spray to prevent defoliation.

An aerial survey conducted in the early summer of 1964 showed that the number of infestation centers in eastern Washington had increased to 72 involving approximately 17,700 acres. The largest infested area of approximately 7,000 acres of Douglas-fir was in

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1/ Dodge, H.R. and Galen C. Trostle. 1964. Douglas-fir Tussock Moth. U.S.D.A. Forest Pest Leaflet 86.

Spokane County along the south side of the Spokane River beginning at Nine Mile Falls and continuing up-river as far as Knights Lake.

Several complaints concerning the tussock moth were received by the Deer Park District of the Department of Natural Resources from residents of the Nine Mile area, and other locations in the Spokane Valley. Walt Carlson, Farm Forester from the Deer Park District, and Rick Johnsey, Forest Entomologist with the Department of Natural Resources at Olympia, attended several grange meetings in the Spokane Valley to discuss the situation with interested property owners. Entomologists from the U.S. Forest Service, Region 6, were also present at several of the meetings to answer questions about the biology of the moth and explain Forest Service policy concerning control of insects on forests that are privately owned.

Evaluation

Two surveys were conducted in the fall of 1964 to evaluate the effects of natural enemies on the tussock moth populations in the infested area. One of the surveys was initiated to determine if the polyhedral virus disease, which accounts for heavy mortality in the late larval instars, was present. The second survey consisted of sampling tussock moth egg masses to establish the ratio of new-to-old egg masses. This ratio was then used to predict the tussock moth population trend for 1965.

MATERIALS AND METHODS

Virus Survey

Larval samples consisting of dead and living insects were collected from infested areas and sent to Dr. Thompson, Insect Pathologist with the Forest Science Laboratory at Corvallis, Oregon

for an analysis to determine if the polyhedral virus was present. One larva was placed in each vial to prevent the possibility of uninfected larvae becoming infected by diseased specimens.

Egg Mass Survey

A transect was run through all areas where visible defoliation was present and one branch having at least one cocoon on it was removed from each tree sampled. All cocoons (new, old, with and without egg masses) were removed from the terminal 36-inches of the branch. Trees were selected along the transect and sampled in this manner until a total of 200 cocoons were collected. The collected material was placed in plastic bags along with paper labels giving the legal land description of the sample area by quarter-sections. The bags were then sealed with a rubber band and stored in a walk-in cooler. The material was examined at Olympia and separated into old egg masses, new egg masses, empty male cocoons, and parasitized larvae and pupae, or larvae dead from unknown causes. The new egg masses were then sent to Dr. Thompson at the Forest Science Laboratory in Corvallis, Oregon for virus studies.

RESULTS

Virus Survey

The polyhedral virus was present in all larval samples analyzed by Dr. Thompson. Tussock moth populations have been virtually eliminated by the virus in the Seven Mile and Nine Mile areas located south of the Spokane River. A tussock moth population near Pleasant Prairie also suffered heavy mortality, but there are some survivors that will carry into 1965. The virus also brought about a collapse of tussock moth populations in the vicinity of Colville, Hunter,

and Wilbur, Washington.

Egg Mass Survey

A total of thirty-seven units were sampled for egg masses in the Spokane, Colville, Hunter and Wilbur, Washington areas (Tables 1 and 2). Eight of the 23 samples from the Spokane Valley showed a new-to-old egg mass ratio of 1:1 or greater. All of the remaining samples from the Colville, Hunter and Wilbur areas had a new-to-old egg mass ratio of less than one. The eight sample areas having the 1:1 or greater ratio occupy 2,420 acres. Areas with an egg mass ratio of less than one total 15,280 acres.

PROJECT STATISTICS

Washington State Department of Natural Resources:

		Man-days
Rick Johnsey	Egg Mass Survey	9
	Ratio Determination	9½
	Virus Study	2
	TOTAL	20
United States Forest Service - Region 6		
Dave McComb	Virus Study	4
	Egg Mass Survey	5
Max Ollieu	Egg Mass Survey	7
Victor Stevens	Egg Mass Survey	7
	TOTAL	23
	STATE-FEDERAL TOTAL	43

TABLE I EGG MASS RATIOS COMPUTED FROM DOUGLAS-FIR TUSSOCK MOTH EGG SAMPLES TAKEN IN EASTERN WASHINGTON

Locality	Legal Land Description TWP.	RGE.	SEC.		Plot No.	Egg Mass Ratio New/Old	Area /1 (Acres)
1. Spokane	26N	41E	2	NW¼	1	0/114	100 +
2. Spokane	27N	41E	28	SW¼	2	2/70	100 +
3. Spokane	26N	41E	9	SE¼	3	0/20	100 +
4. Spokane	27N	40E	32	NE¼	4	9/37	100 +
5. Spokane	27N	40E	30	SW¼	5	21/21	1120 *
6. Spokane	26N	39E	9	NE¼	6	9/8	650 *
7. Spokane	26N	39E	5	SE¼	7	49/6	200 *
8. Spokane	26N	38E	29	NE¼	8	0/83	100 +
9. Spokane	26N	38E	7	SE¼	9	1/68	6-100
10. Spokane	26N	41E	23	SW¼	10	11/52	100 +
11. Spokane	27N	42E	6	NW¼	12	0/28	6-100
12. Spokane	29N	42E	31	SE¼	13	0/24	6-100
13. Spokane	28N	42E	28	SE¼	14	8/48	6-100
14. Spokane	28N	41E	16	NW¼	15	0/50	1-5
15. Spokane	26N	44E	17	NW¼	16	43/5	250 *
16. Spokane	26N	44E	16	SE¼	17	27/7	*
17. Spokane	27N	44E	20	SW¼	18	6/20	6-100
18. Spokane	27N	44E	7	SW¼	20	58/7	*
19. Spokane	27N	44E	24	NE¼	21	18/11	200 *
20. Spokane	28N	44E	31	NE¼	22	22/11	*
21. Spokane	27N	42E	28	NW¼	25	2/28	6-100

/1 Area was computed with a planimeter from aerial sketch maps.

* Areas having a new-to-old egg mass ratio of 1:1 or greater.

Locality		Legal Land Description TWP.	RGE.	SEC.		Plot No.	Egg Mass Ratio New/Old	Area/1 (Acres)
22.	Spokane	27N	42E	22	SW¼	26	3/18	6-100
23.	Spokane	30N	41E	12	SE¼	27	1/29	1-5
24.	Danville	40N	34E	3	SW¼	A	0/10	1
25.	Curlew	39N	33E	15	NE¼	B	0/54	6-100
26.	Colville	36N	39E	20	SW¼	D	0/70	1-5
27.	Colville	36N	39E	18	SE¼	E	0/38	6-100
28.	Colville	36N	39E	6	NE¼	F	1/23	1-5
29.	Colville	37N	39E	32	NW¼	G	0/52	6-100
30.	Colville	36N	39E	9	SE¼	H	3/19	1-5
31.	Hunters	30N	37E	6	NW¼	34	5/12	1-5
32.	Hunters	30N	37E	6	NE¼	41	1/38	6-100
33.	Hunters	30N	37E	18	NW¼	42	2/49	6-100
34.	Wilbur	27N	34E	5	SW¼	51	23/27	6-100
35.	Wilbur	28N	33E	24	NE¼	52	6/103	6-100
36.	Wilbur	28N	33E	29	SW¼	53	26/57	6-100
37.	Wilbur	28N	33E	33	SW¼	54	1/99	6-100

/1 Area was computed with a planimeter from aerial sketch maps.

TABLE 2 LOCATION OF SAMPLE PLOTS AND POPULATION TREND EXPECTED IN 1965

Area	County	Plot No.	Population Trend	Larval Mortality from Virus /2
Nine Mile	Spokane	1, 2, 3	Down	
Long Lake	Spokane	4, 5	Down or Static	
Spring Creek	Lincoln	6, 7	Up	4 %
Mill Canyon	Lincoln	8, 9	Down	
Seven Mile	Spokane	10	Down	
Wild Rose Prairie	Spokane	12, 13, 14	Down	
Five Sisters	Spokane	15	Down	
Pleasant Prairie	Spokane	16, 17	Up	14.8 %
Green Bluff	Spokane	18, 20, 21	Up	32-36 %
Deer Creek	Spokane	22	Up	10 %
McKay Hill	Spokane	25, 26	Down	
Deer Lake	Stevens	27	Down	
Hunters	Stevens	34, 41, 42	Down	
Jump Canyon	Lincoln	51	Down	
Moyer Canyon	Lincoln	52	Down	
Speigle Canyon	Lincoln	54	Down	
Danville	Ferry	A	Down	
Curlew	Ferry	B	Down	
Mill Creek	Stevens	D, E	Down	
Clugston Creek	Stevens	F, G	Down	
Gillette Creek	Stevens	H	Down	

/2 Mortality of larvae from egg masses sent to Dr. Thompson for analysis.

CONCLUSION

Douglas-fir tussock moth populations on the Pleasant Prairie, Spring Creek, Green Bluff and Deer Creek areas in the Spokane Valley showing an egg mass ratio of 1:1 or greater exhibit an upward trend for 1965. On an area basis, this involves approximately 2,420 acres as compared to a total area of infestation of 17,700 acres in 1964. More defoliation can be expected to occur in these areas in 1965.

A polyhedral virus disease appears to have virtually eliminated the tussock moth populations in the Seven Mile and Nine Mile areas south of the Spokane River. In areas located near Colville, Hunters, and Wilbur, Washington, the virus disease has reduced the tussock moth populations to low levels with a resulting low ratio of new-to-old egg masses.

RECOMMENDATIONS

A large scale control project should not be needed to control the Douglas-fir tussock moth in northeastern Washington during 1965.

According to recent findings by the U. S. Forest Service, malathion is no longer considered effective in controlling the tussock moth. The only acceptable chemical for control of the tussock moth at this time is D.D.T. If control of the tussock moth is attempted by private parties, the residual properties of D.D.T. should be kept in mind, particularly when spraying near pasture lands and crops grown for forage or interstate sale. D.D.T. may be applied according to directions given by McComb. 3/

All insecticides are hazardous, differing only in the degree of hazard. They are classified as being: very hazardous, moderately hazardous, or of a low hazard level. Regardless of the level of toxicity, proper precautions

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3/ McComb, David. Insecticide Application for Douglas-fir Tussock Moth Control. U.S. Forest Service, Division of Timber Management, Insect and Disease Control Branch. February, 1964.

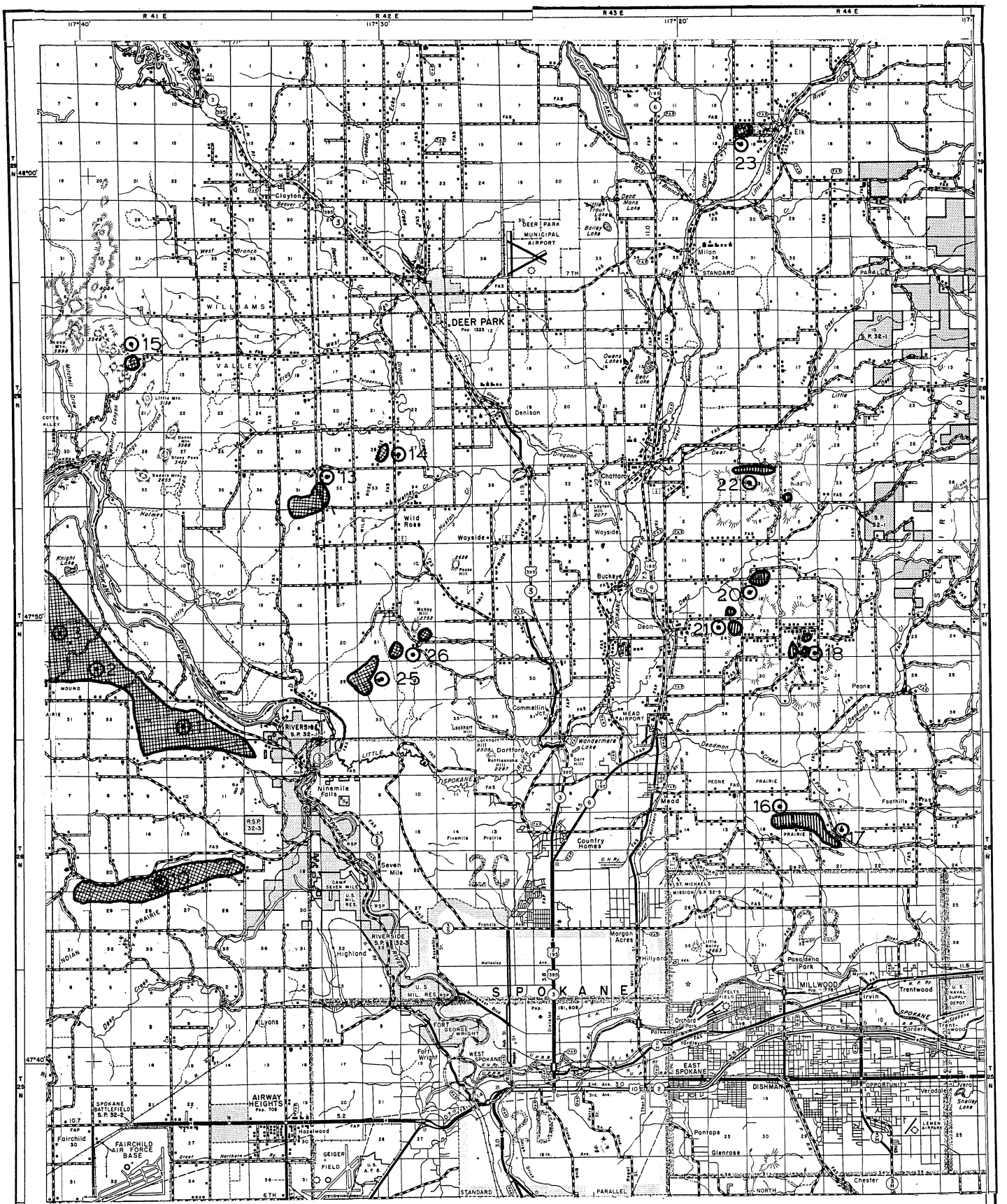
must be followed in handling, mixing, applying, and storing. When using a pesticide follow these rules:

1. Know which pesticide is the most feasible for the situation needing treatment.
2. Read the label on the container and follow recommended safety practices.
3. Know the correct dosage and mixing requirements to prevent damage to plants and animals.
4. Use the respirator, gloves, or other protective equipment as recommended.
5. When applying dusts or sprays, work from a position which will keep the pesticide drift from falling on the operator.
6. Keep children or irresponsible adults, pets, and livestock out of loading or storage sites, and areas in which application is in process. These precautions are important when using highly toxic pesticides.
7. Wash hands immediately after contact with pesticides, and before smoking or handling food. Do not eat, drink or smoke while in the act of using pesticides.
8. Select sites for loading and storage that will prevent contaminating streams, ponds, cisterns, food stocks or crops adjacent to work area.
9. Pick up and safely dispose of empty pesticide bags or containers immediately after use.
10. Never use milk or beverage bottles, or other types of food containers for storage of pesticides.
11. Clean up spilled pesticides at once.

12. Immediately remove clothing contaminated by accidental spillage. Change clothing and shower thoroughly after working with pesticides.

13. Become familiar with first-aid treatment needed in case of pesticide poisoning.

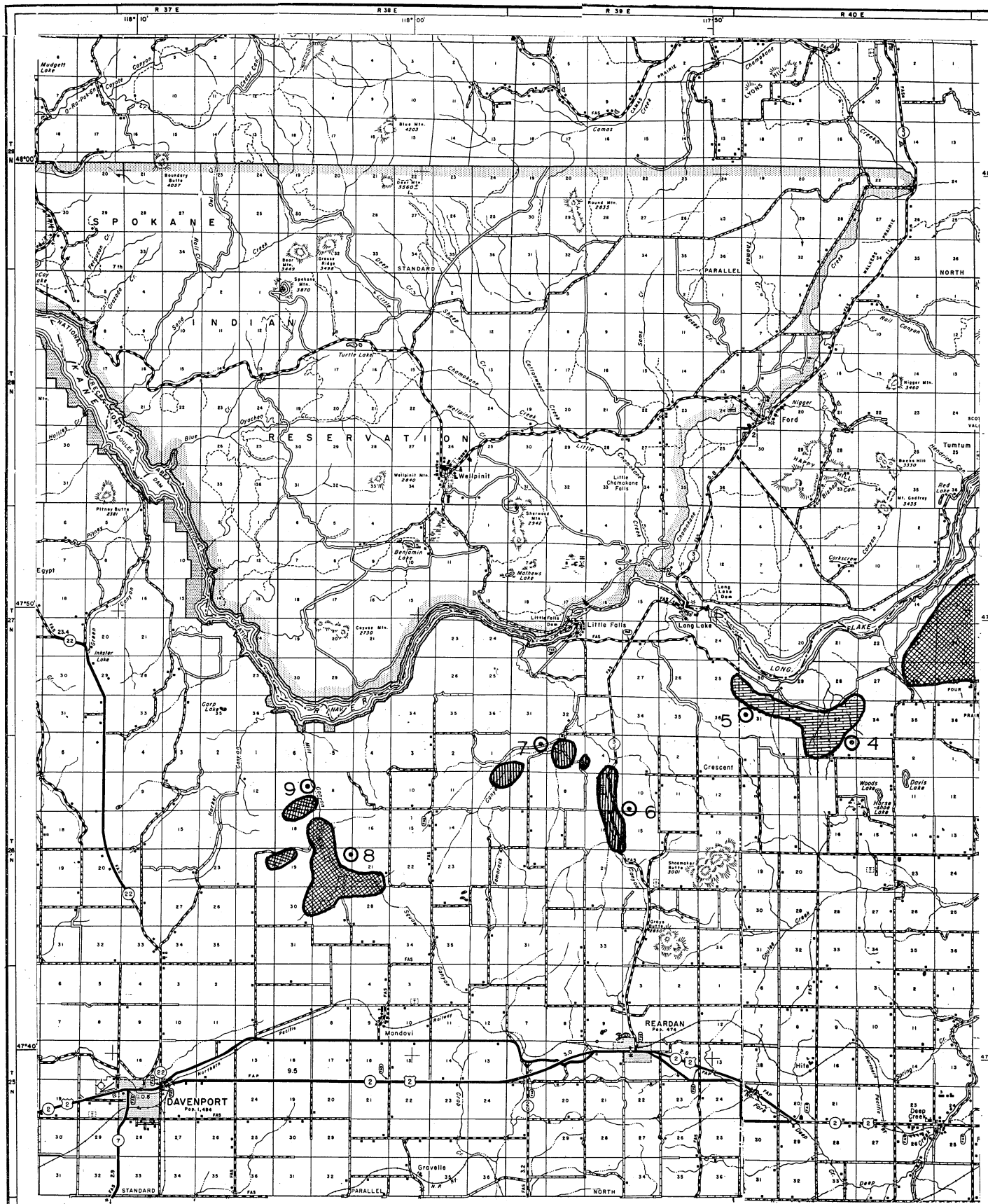
14. Know where and how medical help can be obtained as soon as needed if you or a co-worker becomes ill as a result of handling pesticides.



TUSSOCK MOTH INFESTATION IN EASTERN WASHINGTON

TREND:

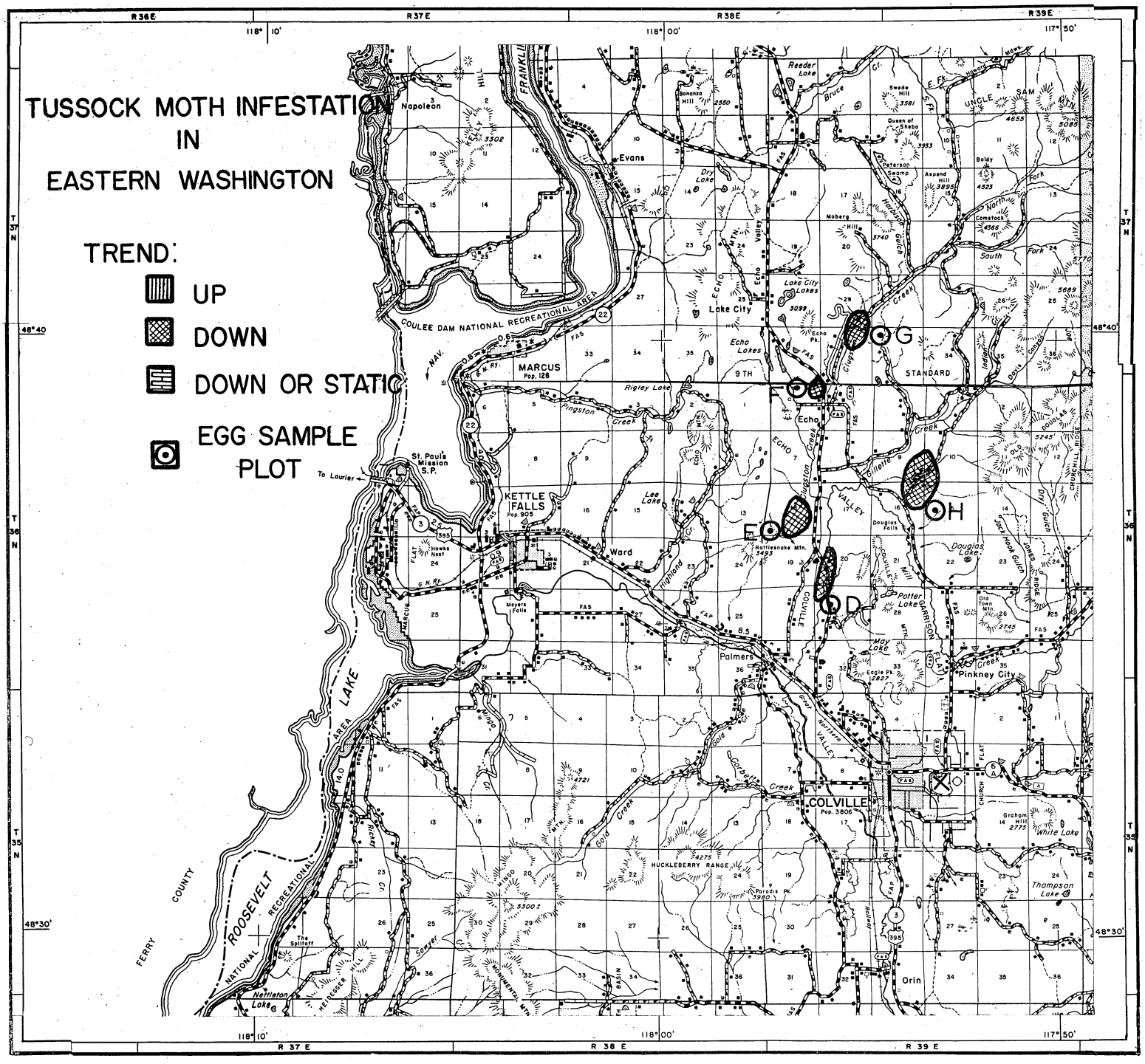
UP + DOWN DOWN OR STATIC EGG SAMPLE PLOT

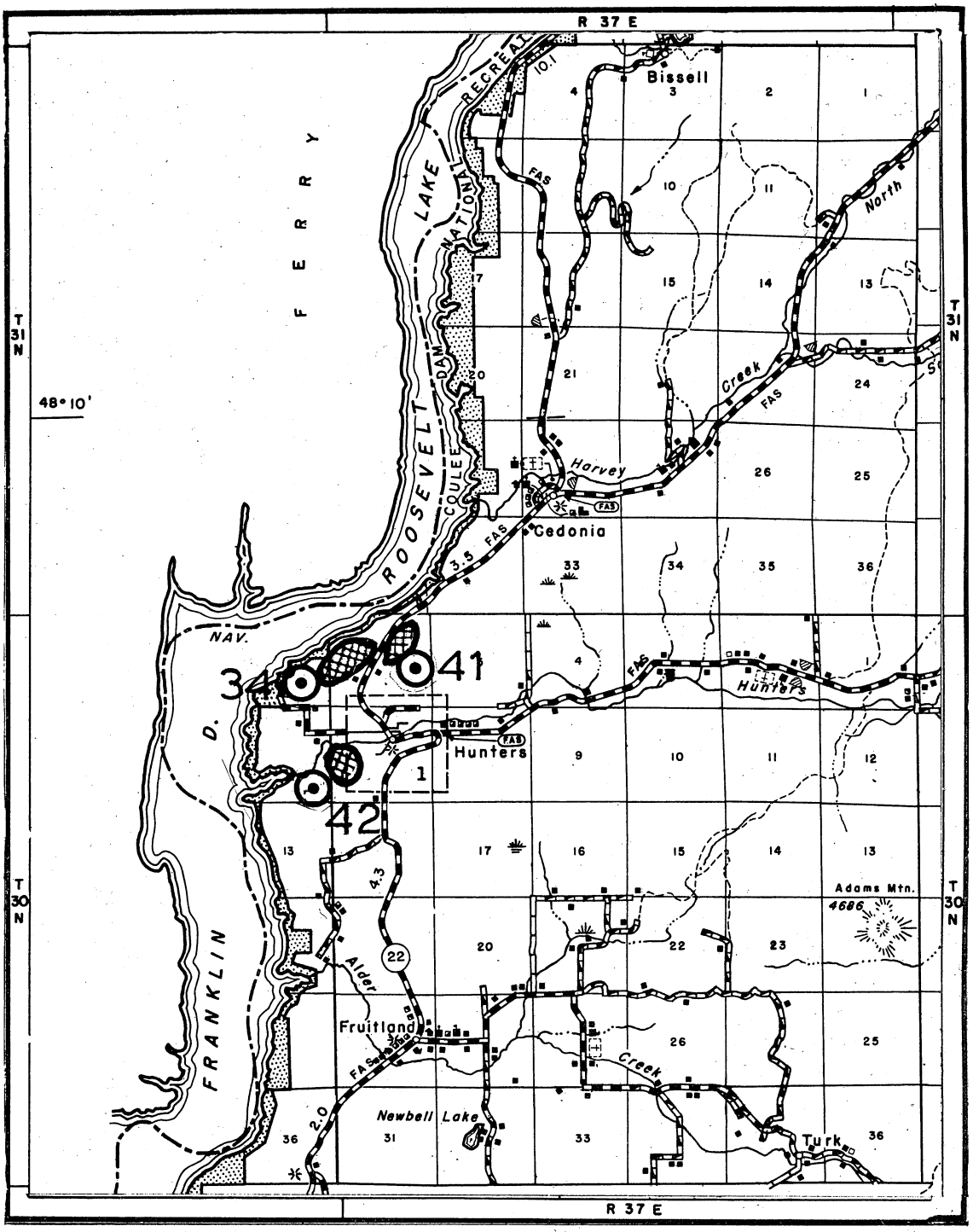


TUSSOCK MOTH INFESTATION IN EASTERN WASHINGTON

TREND:

UP | DOWN | DOWN OR STATIC | EGG SAMPLE PLOT

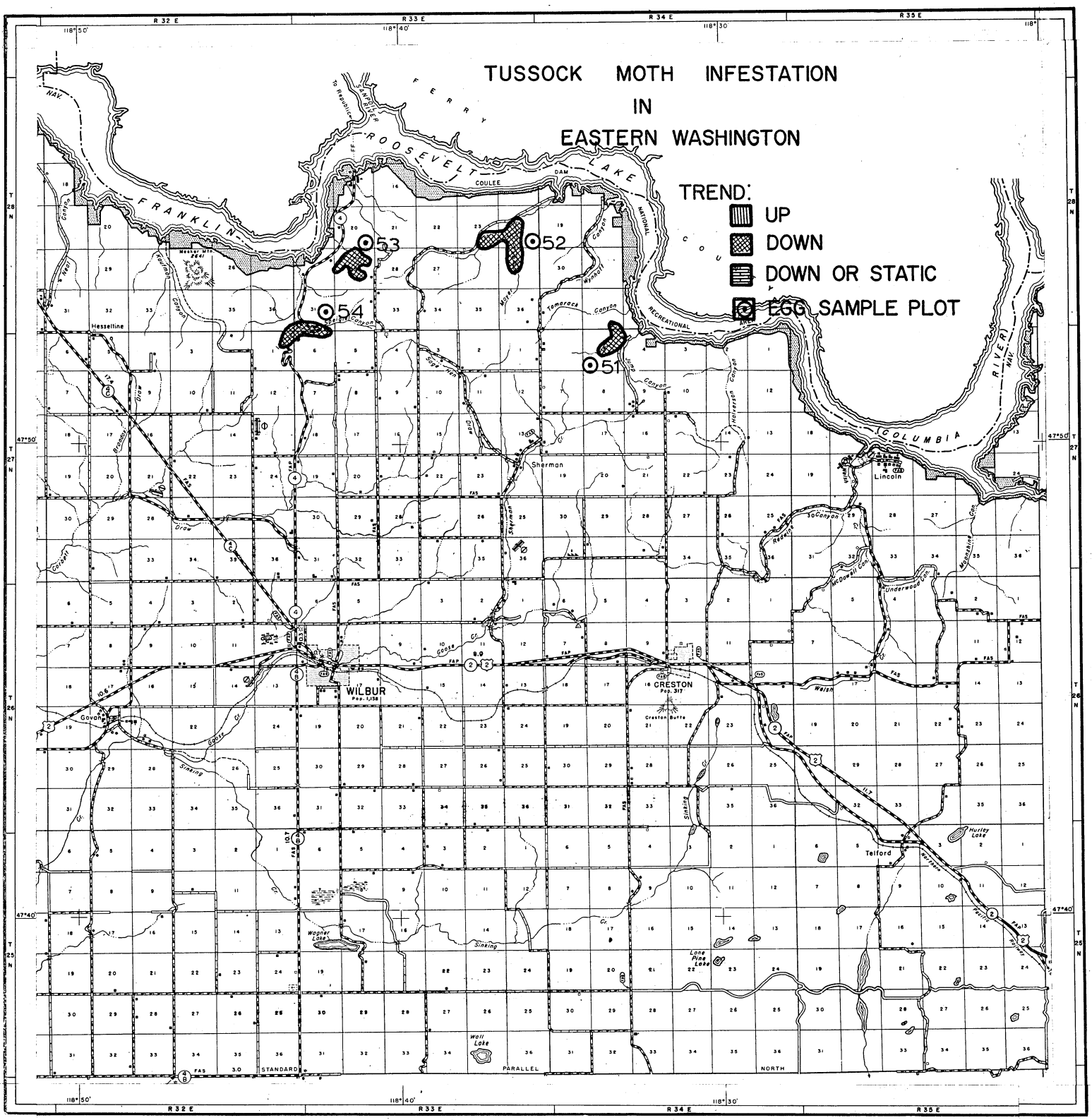

TUSSOCK MOTH INFESTATION
IN
EASTERN WASHINGTON
TREND:
UP
DOWN
DOWN OR STATIC
EGG SAMPLE PLOT
R36E
R37E
R38E
R39E
118° 10'
118° 00'
117° 50'
48°40'
48°30'
T 37 N
T 36 N
T 35 N
Napoleon
Evans
Lake City
MARCUS
Pop. 126
COULEE DAM NATIONAL RECREATIONAL AREA
St. Paul's Mission S.P.
To Laurier
KETTLE FALLS
Pop. 905
Ward
Rattlesnake Mtn.
Palmers
Pinkney City
COLVILLE
Pop. 3806
Orin
Evans
Echo
STANDARD
Lake City Lakes
Echo Lakes
Rigley Lake
Lee Lake
Potter Lake
Thompson Lake
White Lake
Netteleton Lake
The Splittoff
HUCKLEBERRY RANGE
ROOSEVELT LAKE
ROOSEVELT RECREATIONAL AREA
FERRY COUNTY
Reeder Lake
Dry Lake
Moberg Hills
Aspend Hill
Boldy
Comstock
Douglas Falls
Douglas Lake
Old Town Mtn.
Eagle Pk.
Paradis Pk.
Graham Hill
Meyers Falls
Hawks Nest
Highland
Gold Creek
Gatchee Creek
Sanders
Kettle River
Monumental Mtn.
Big Sheep Creek
Colville River
Great Northern
Valley
Echo Valley
Garrison Flat
Church Flat
Jack Hook Gulch
Dry Gulch
Churchill Ridge
Jones Ridge
Douglas Creek
Indian Canyon
Deer Creek
Swede Hill
Queen of Sheba
Peterson Swamp
Bruce
Hodson Gulch
Clugston Creek
Echo Creek
Dilleine
Mill
Mov Lake
Eagle Pk.
Bonanza Hill
Napoleon Hill
Frankli Hill
Uncle Sam Mtn.
North Fork
South Fork
E. Fk.
Mtn.
Valley
Creek
Lake
Hill
Ridge
Basin
Flat
Canyon
Gulch
Pk.
Hills



TUSSOCK MOTH INFESTATION IN EASTERN WASHINGTON

TREND:

- UP
- DOWN
- DOWN OR STATIC
- EGG SAMPLE PLOT


TUSSOCK MOTH INFESTATION
IN
EASTERN WASHINGTON
TREND:
UP
DOWN
DOWN OR STATIC
EGG SAMPLE PLOT
53
52
54
51
FRANKLIN
ROOSEVELT
LAKE
COULEE DAM
FERRY
COLUMBIA
RIVER
Hesseline
Sherman
Lincoln
WILBUR
Pop. 1,158
CRESTON
Pop. 317
Telford
Wagner Lake
Wall Lake
Lane Pine Lake
Hurley Lake
STANDARD PARALLEL NORTH
R 32 E
R 33 E
R 34 E
R 35 E
118° 50'
118° 40'
118° 30'
47° 50'
47° 40'